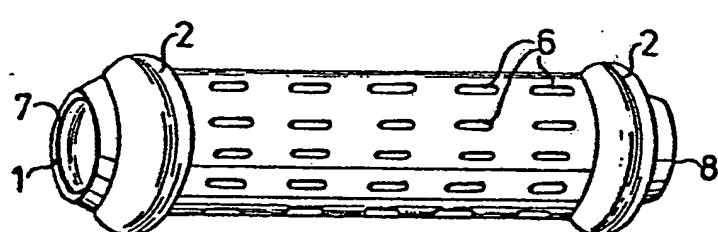


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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/SE80/00002</p> <p>(22) International Filing Date: 3 January 1980 (03.01.80)</p> <p>(31) Priority Application Number: 7900282-0</p> <p>(32) Priority Date: 12 January 1979 (12.01.79)</p> <p>(33) Priority Country: SE</p> <p>(71) Applicant (<i>for all designated States except US</i>): AB TESI [SE/SE]; Strandvägen 43 IV, S-114 56 Stockholm (SE).</p> <p>(72) Inventor, and</p> <p>(75) Inventor/Applicant (<i>for US only</i>): SILANDER, Torsten [SE/SE]; Strandvägen 43 IV, S-114 56 Stockholm (SE).</p>		<p>(74) Agent: ÖRTENBLAD, Bertil; Noréns Patentbyrå AB, Banérsgatan 73, S-115 26 Stockholm (SE).</p> <p>(81) Designated States: BR, CH, DE, DK, FR (European patent), GB, JP, NO, SU, US.</p> <p><b>Published</b>  <i>With international search report  In English translation (filed in Swedish)</i></p>	
<p>(54) Title: CATHETER</p> 			
<p>(57) Abstract</p> <p>A catheter intended to be inserted in a body duct, vessel or cavity in order to maintain the passage of liquid, gas or solid substances. The catheter (1) is made of plastic. The catheter (1) is characterized in that it is provided with an outer casing (2-5), which entirely or partially covers the catheter (1) and consists of a hydrophilic plastic substance capable to suck up liquid and thereby to increase its volume, i.e. to swell, and that the catheter (1) maintains its position after its insertion into a body duct, vessel or cavity.</p>			

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## Catheter

This invention relates to a catheter, the object of which is to widen a constricted body duct, vessel or cavity in order 5 to facilitate and/or render possible the passage of liquid, gaseous or solid substances in said duct.

The invention thus relates to a catheter, the shape of which conforms with the body duct, vessel or cavity in question, whereby the catheter according to the invention can assume 10 many forms and dimensions.

In medical attendance plastic catheters are inoperated or inserted to an ever increasing extent in order to maintain and/or render possible the passage of a liquid, gas or solid substances, for example through a body duct or vessel. When, 15 for example, the opening of the gall into the duodenum is constricted by a tumour, the passage through the constricted portion of the bile duct can be maintained by means of a plastic catheter or tube.

A plastic catheter, briefly, is inserted into the bile duct 20 in such a manner, that a long cannula is inserted into the liver through the thorax wall whereby a widened portion of the bile duct is pricked. A flexible narrow metal conductor is inserted at irradiation through the cannula, whereafter the cannula is removed. A plastic catheter is threaded over 25 the inserted conductor, and the metal conductor is removed. Through the plastic catheter bile is led off. At a later phase, the metal conductor again is inserted, at irradiation, through the plastic catheter. Thereafter the plastic catheter is withdrawn, and the metal conductor is worked past the 30 constricted portion.

On the conductor a so-called endoprosthesis is now threaded, which is about 3 cm long and has a diameter of about 1,5 mm,



and which is provided with a great number of lateral holes. The endoprosthesis is inserted into position by a normal plastic catheter and is so to be placed in the obstacle, that bile passes to the intestine.

5 As is apparent from the aforesaid, in this case, and in many other cases, a so-called endoprosthesis or catheter can be inserted into a body duct, vessel or cavity without requesting the area in question to be exposed by operation.

Known endoprostheses and catheters, however, have such a design that they tend to be displaced in the duct in which they are located and thereby again block or render impossible the passage. Such a displacement may even have other serious consequences.

15 The present invention solves this serious problem, which at present constitutes the overshadowing disadvantage of this relatively simple method of rendering possible flow in a constricted body duct etc.

20 The invention thus relates to a catheter or tube to be positioned in a body duct, vessel or cavity in order to maintain the passage of liquid, gas or solid substances.

The invention is characterized in that the catheter, which in known manner is made entirely or partially of a plastic material, is provided on its shell surface with an outer casting, which entirely or partially covers the catheter and consists of a hydrophilic plastic substance capable to suck up liquid and thereby to increase its volume, i.e. to swell.

The invention is described in greater detail in the following, with reference to the accompanying drawing showing embodiments of a catheter, in which drawing

30 Fig. 1a shows a catheter according to the invention by way of a first embodiment,



- Fig. 1b is a lateral view of the catheter,  
Figs. 2a and 3a, show a catheter according to two other  
respectively, embodiments,  
Figs. 2b and 3b, are lateral views of the respective cathet-  
5 respectively, er,  
Fig. 4a shows a catheter partially provided with  
a network of a hydrophilic plastic subst-  
ance, which network is drawn completely  
to the right, and its remaining part is  
shown schematically, and  
10 Fig. 4b is a lateral view of the catheter.

In Figs. 1a-4b a catheter 1 is shown, the design of which is adapted to be inserted, for example, into a bile duct. The catheter, of course, can be used for some other body duct, 15 vessel or cavity in order to maintain the passage of liquid, gas or solid substances. The design of the catheter also can be changed, for example with respect to the length/diameter ratio, depending on the intended application.

The catheter 1 is manufactured of a plastic material and of 20 tubular shape. On its shell surface the catheter is provided with an outer casing 2-5, which entirely or partially covers the plastic catheter. In the Figs. 1a-4b only partially cov-  
ering casings 2-5 are shown.

The catheter 1 further can be provided with a great number of 25 holes 6. When the catheter 1 entirely or a great part thereof is covered with an outer casing, holes through the casing can be provided. The casing 2-5 according to the invention consists of a hydrophilic plastic substance capable to suck up liquid and thereby to increase its volume, i.e. to swell.

30 Such a hydrophilic plastic substance is held available by the company Special Polymer Ltd. England. The hydrophilic plastic substance, or the catheter, or both preferably are of a plastic material dense as determined by X-rays, whereby the insert



of the endoprosthesis is facilitated and control of its position made possible.

According to the embodiment shown in Figs. 1a-b, the catheter 1 is provided adjacent or at its ends 7,8 with concentrically 5 located annular areas or beads 2, which above were called casings and which consist of said hydrophilic plastic substance.

In Figs. 2a-b a catheter 1 is shown, where a number of beads 3 are located along the length of the catheter.

10 The Figs. 3a-b show an embodiment, at which two V-shaped areas or beads 4 are provided on the shell surface of the plastic catheter 1. The number of V-shaped beads 4, of course, can be more than two.

The said plastic substance, according to an embodiment shown 15 in Figs. 4a-b, is attached to the catheter 1 in the form of a network 9, which clearly is shown at 10, and the remaining parts of which are shown schematically.

The network can be attached as shown on parts of the catheter or along the entire catheter.

20 For application, an endoprosthesis according to the invention is inserted into a body duct or cavity in a condition at which the hydrophilic plastic substance is not swollen. After the insertion, the hydrophilic plastic substance swells when it sucks up surrounding body liquid. At this swelling, the inner 25 diameter of the catheter 1 is substantially unchanged. Hereby, thus, the body duct is widened at the place for said casings 2-5 whereby the endoprosthesis substantially entirely is prevented from being transported in the body duct.

The core in the present invention is so to design an endoprosthesis that it is retained in a body duct. Therefore, other catheters of the most different forms are considered comprised in the present invention to the extent defined by the attached claims.



## Claims

1. A catheter intended to be inserted into a body duct, vessel or cavity in order to maintain the passage of liquid, gas or solid substances, characterized in that the catheter (1), which in known manner is made entirely or partially of a plastic material, is provided on its shell surface with an outer casing (2-5), which entirely or partially covers the catheter (1) and consists of a hydrophilic plastic substance capable to suck up liquid and thereby to increase its volume, i.e. to swell.
2. A catheter as defined in claim 1, characterized in that the catheter (1) adjacent or at its ends is provided with concentrically located annular areas or beads (2) of said plastic substance.
3. A catheter as defined in claim 2, characterized in that along the length of said catheter (1) a plurality of said beads or areas (3) are provided.
4. A catheter as defined in claim 1, characterized in that a plurality of V-shaped areas (4) or beads of said plastic substance are located on the shell surface of the catheter (1).
5. A catheter as defined in claim 1, characterized in that said plastic substance is attached to the catheter (1) in the form of a network (5) on the entire or parts of the catheter.
6. A catheter as defined in any one of the preceding claims, characterized in that the catheter (1) is manufactured of a plastic material dense as determined by X-rays.



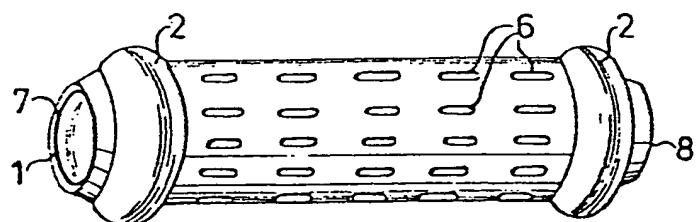


Fig. 1a

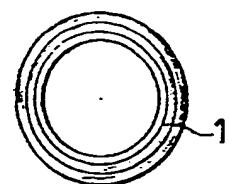


Fig. 1b

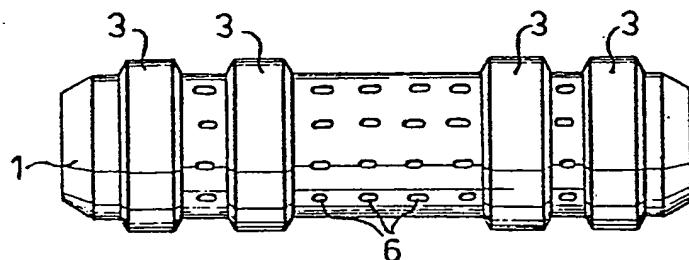


Fig. 2a

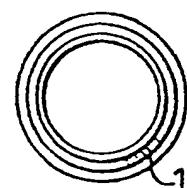


Fig. 2b

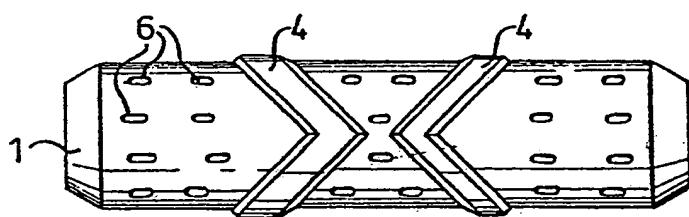


Fig. 3a

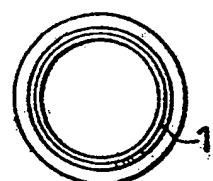


Fig. 3b

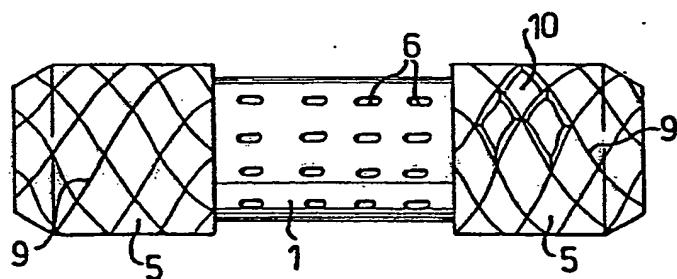


Fig. 4a

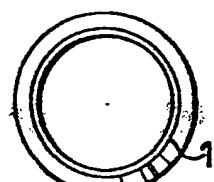


Fig. 4b

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# INTERNATIONAL SEARCH REPORT

International Application No. PCT/SE80/00002

## I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) <sup>3</sup>

According to International Patent Classification (IPC) or to both National Classification and IPC 3

A 61 M 25/00, A 61 L 15/00

## II. FIELDS SEARCHED

Minimum Documentation Searched <sup>4</sup>

Classification System	Classification Symbols
IPC	A 61 L 15/00; A 61 M 25/00-02, 29/00-02
Deutsche Kl	30k:17/02-03, 18/01-02
US Cl	128:343, 348-350

Chemical Abstracts index Vol 51-91

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched <sup>5</sup>

catheters

SE, NO, DK, FI classes as above

## III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>14</sup>

Category <sup>6</sup>	Citation of Document, <sup>15</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>
A	DE, A, 2 224 152 published 1973, March 1, Ortho Pharmaceutical Corp.	1
A	DE, A, 2 016 607 published 1970, November 1, Sheridan David S	6
A	DE, 2 247 739 published 1973, April 12, Tscheskoslovenska akademie ved.	1
A	FR, A1, 2 364 665 published 1978, April 14, Sorenson Research Co	1,2
X	US, A, 3 889 685 published 1975, June 17, Cutter Laboratories, Inc.	1,2

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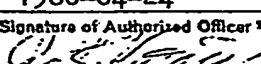
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"P" document published prior to the International filing date but on or after the priority date claimed

"T" later document published on or after the International filing date or priority date and not in conflict with the application, but cited to understand the principle or theory underlying the invention

"X" document of particular relevance

## IV. CERTIFICATION

Date of the Actual Completion of the International Search <sup>3</sup>	Date of Mailing of this International Search Report <sup>3</sup>
1980-03-24	1980-04-24
International Searching Authority <sup>1</sup>	Signature of Authorized Officer <sup>20</sup>  Leif Vingård